**ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ**

**ΠΑΙΔΑΓΩΓΙΚΟ ΤΜΗΜΑ ΔΗΜΟΤΙΚΗΣ ΕΚΠΑΙΔΕΥΣΗΣ**

**ΕΡΓΑΣΙΑ 1**

**ΒΑΤΣΙΟΥ ΠΑΝΑΓΙΩΤΑ**

**Α.Ε.Μ.: 4373**

***ECOLOGY***

# Sustainability

## Sustainability

In [ecology](https://en.wikipedia.org/wiki/Ecology" \o "Ecology), sustainability (from sustain and ability) is the property of [biological systems](https://en.wikipedia.org/wiki/Biological_system" \o "Biological system) to remain [diverse](https://en.wikipedia.org/wiki/Biodiversity" \o "Biodiversity) and [productive](https://en.wikipedia.org/wiki/Productivity_(ecology)" \o "Productivity (ecology)) indefinitely. Long-lived and healthy [wetlands](https://en.wikipedia.org/wiki/Wetlands" \o "Wetlands) and [forests](https://en.wikipedia.org/wiki/Forests" \o "Forests) are examples of sustainable biological systems. In more general terms, sustainability is the endurance of systems and processes. The [organizing principle](https://en.wikipedia.org/wiki/Organizing_principle" \o "Organizing principle) for sustainability is [sustainable development](https://en.wikipedia.org/wiki/Sustainable_development" \o "Sustainable development), which includes the four interconnected domains: ecology, economics, politics and culture. [Sustainability science](https://en.wikipedia.org/wiki/Sustainability_science" \o "Sustainability science) is the study of sustainable development and environmental science.

Sustainability can also be defined as a socio-ecological process characterized by the pursuit of a common ideal. An ideal is by definition unattainable in a given time and space. However, by persistently and dynamically approaching it, the process results in a sustainable system.

Healthy ecosystems and [environments](https://en.wikipedia.org/wiki/Natural_environment" \o "Natural environment) are necessary to the survival of humans and other [organisms](https://en.wikipedia.org/wiki/Organisms" \o "Organisms). Ways of reducing negative human impact are [environmentally-friendly](https://en.wikipedia.org/wiki/Environmentally-friendly" \o "Environmentally-friendly) [chemical engineering](https://en.wikipedia.org/wiki/Chemical_engineering" \o "Chemical engineering), [environmental resources management](https://en.wikipedia.org/wiki/Environmental_resources_management" \o "Environmental resources management) and [environmental protection](https://en.wikipedia.org/wiki/Environmental_protection" \o "Environmental protection). Information is gained from [green computing](https://en.wikipedia.org/wiki/Green_computing" \o "Green computing), [green chemistry](https://en.wikipedia.org/wiki/Green_chemistry" \o "Green chemistry), [earth science](https://en.wikipedia.org/wiki/Earth_science" \o "Earth science), [environmental science](https://en.wikipedia.org/wiki/Environmental_science" \o "Environmental science) and [conservation biology](https://en.wikipedia.org/wiki/Conservation_biology" \o "Conservation biology). [Ecological economics](https://en.wikipedia.org/wiki/Ecological_economics" \o "Ecological economics)studies the fields of academic research that aim to address human economies and natural ecosystems.

Moving towards sustainability is also a social challenge that entails [international](https://en.wikipedia.org/wiki/International_law" \o "International law) and national [law](https://en.wikipedia.org/wiki/Law" \o "Law), [urban planning](https://en.wikipedia.org/wiki/Urban_planning" \o "Urban planning) and [transport](https://en.wikipedia.org/wiki/Transport" \o "Transport), local and individual [lifestyles](https://en.wikipedia.org/wiki/Lifestyle_(sociology)" \o "Lifestyle (sociology)) and [ethical consumerism](https://en.wikipedia.org/wiki/Ethical_consumerism" \o "Ethical consumerism). Ways of living more sustainably can take many forms from reorganizing living conditions (e.g., [ecovillages](https://en.wikipedia.org/wiki/Ecovillages" \o "Ecovillages), [eco-municipalities](https://en.wikipedia.org/wiki/Eco-municipalities" \o "Eco-municipalities) and [sustainable cities](https://en.wikipedia.org/wiki/Sustainable_cities" \o "Sustainable cities)), reappraising economic sectors ([permaculture](https://en.wikipedia.org/wiki/Permaculture" \o "Permaculture), [green building](https://en.wikipedia.org/wiki/Green_building" \o "Green building), [sustainable agriculture](https://en.wikipedia.org/wiki/Sustainable_agriculture" \o "Sustainable agriculture)), or work practices ([sustainable architecture](https://en.wikipedia.org/wiki/Sustainable_architecture" \o "Sustainable architecture)), using science to develop new technologies ([green technologies](https://en.wikipedia.org/wiki/Green_technologies" \o "Green technologies), [renewable energy](https://en.wikipedia.org/wiki/Renewable_energy" \o "Renewable energy) and sustainable [fission](https://en.wikipedia.org/wiki/Generation_IV_reactor" \o "Generation IV reactor) and [fusion power](https://en.wikipedia.org/wiki/Fusion_power" \o "Fusion power)), or designing systems in a flexible and reversible manner, and adjusting individual [lifestyles](https://en.wikipedia.org/wiki/Lifestyle_(sociology)" \o "Lifestyle (sociology)) that conserve natural resources.

"The term 'sustainability' should be viewed as humanity's target goal of human-ecosystem equilibrium (homeostasis), while 'sustainable development' refers to the holistic approach and temporal processes that lead us to the end point of sustainability." (305) Despite the increased popularity of the use of the term "sustainability", the possibility that human societies will achieve environmental sustainability has been, and continues to be, questioned—in light of [environmental degradation](https://en.wikipedia.org/wiki/Environmental_degradation" \o "Environmental degradation), [climate change](https://en.wikipedia.org/wiki/Climate_change" \o "Climate change), [overconsumption](https://en.wikipedia.org/wiki/Overconsumption" \o "Overconsumption), population growth and societies' pursuit of unlimited [economic growth](https://en.wikipedia.org/wiki/Economic_growth" \o "Economic growth) in a [closed system](https://en.wikipedia.org/wiki/Closed_system" \o "Closed system).

The name sustainability is derived from the [Latin](https://en.wikipedia.org/wiki/Latin" \o "Latin) sustinere (tenere, to hold; sub, under). Sustain can mean "maintain", "support", or "endure". Since the 1980s sustainability has been used more in the sense of human sustainability on planet Earth and this has resulted in the most widely quoted definition of sustainability as a part of the concept [sustainable development](https://en.wikipedia.org/wiki/Sustainable_development" \o "Sustainable development), that of the [Brundtland Commission](https://en.wikipedia.org/wiki/Brundtland_Commission" \o "Brundtland Commission) of the [United Nations](https://en.wikipedia.org/wiki/United_Nations" \o "United Nations) on March 20, 1987: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

The [2005 World Summit on Social Development](https://en.wikipedia.org/wiki/2005_World_Summit) identified sustainable development goals, such as economic development, social development and environmental protection. This view has been expressed as an illustration using three overlapping ellipses indicating that the three pillars of sustainability are not mutually exclusive and can be mutually reinforcing. In fact, the three pillars are interdependent, and in the long run none can exist without the others. The three pillars have served as a common ground for numerous [sustainability standards and certification](https://en.wikipedia.org/wiki/Sustainability_standards_and_certification) systems in recent years, in particular in the food industry. Standards which today explicitly refer to the triple bottom line include [Rainforest Alliance](https://en.wikipedia.org/wiki/Rainforest_Alliance), [Fairtrade](https://en.wikipedia.org/wiki/Fairtrade" \o "Fairtrade) and [UTZ Certified](https://en.wikipedia.org/wiki/UTZ_Certified). Some sustainability experts and practitioners have illustrated four pillars of sustainability, or a quadruple bottom line. One such pillar is future generations, which emphasizes the long-term thinking associated with sustainability. There is also an opinion that considers resource use and financial sustainability as two additional pillars of sustainability.

Sustainable development consists of balancing local and global efforts to meet basic human needs without destroying or degrading the natural environment. The question then becomes how to represent the relationship between those needs and the environment.

A study from 2005 pointed out that [environmental justice](https://en.wikipedia.org/wiki/Environmental_justice) is as important as sustainable development. Ecological economist [Herman Daly](https://en.wikipedia.org/wiki/Herman_Daly) asked, "what use is a sawmill without a forest?" From this perspective, the economy is a subsystem of human society, which is itself a subsystem of the biosphere, and a gain in one sector is a loss from another. This perspective led to the nested circles figure of 'economics' inside 'society' inside the 'environment'.

The simple definition that sustainability is something that improves "the [quality of human life](https://en.wikipedia.org/wiki/Quality_of_life) while living within the carrying capacity of supporting eco-systems", though vague, conveys the idea of sustainability having quantifiable limits. But sustainability is also a call to action, a task in progress or "journey" and therefore a political process, so some definitions set out common goals and values. The [Earth Charter](https://en.wikipedia.org/wiki/Earth_Charter) speaks of "a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace". This suggested a more complex figure of sustainability, which included the importance of the domain of 'politics'.

More than that, sustainability implies responsible and proactive decision-making and innovation that minimizes negative impact and maintains balance between ecological resilience, economic prosperity, political justice and cultural vibrancy to ensure a desirable planet for all species now and in the future. Specific types of sustainability include, [sustainable agriculture](https://en.wikipedia.org/wiki/Sustainable_agriculture), [sustainable architecture](https://en.wikipedia.org/wiki/Sustainable_architecture) or [ecological economics](https://en.wikipedia.org/wiki/Ecological_economics). Understanding sustainable development is important but without clear targets an unfocused term like "liberty" or "justice". It has also been described as a "dialogue of values that challenge the sociology of development".

# Sustainable development

## 2.1 Sustainable development

Sustainable development is the [organizing principle](https://en.wikipedia.org/wiki/Organizing_principle) for meeting [human development](https://en.wikipedia.org/wiki/Human_development_(humanity)) goals while at the same time [sustaining](https://en.wikipedia.org/wiki/Sustainability) the ability of natural systems to provide the [natural resources](https://en.wikipedia.org/wiki/Natural_resource) and [ecosystem services](https://en.wikipedia.org/wiki/Ecosystem_services) upon which the [economy](https://en.wikipedia.org/wiki/Economy) and [society](https://en.wikipedia.org/wiki/Society) depend. The desired result is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system and sustainable development can be classified as development that meet the needs of the present without compromising the ability of the future generation.

While the modern concept of sustainable development is derived mostly from the 1987 [Brundtland Report](https://en.wikipedia.org/wiki/Brundtland_Commission" \o "Brundtland Commission), it is also rooted in earlier ideas about [sustainable forest management](https://en.wikipedia.org/wiki/Sustainable_forest_management) and twentieth century environmental concerns. As the concept developed, it has shifted to focus more on [economic development](https://en.wikipedia.org/wiki/Economic_development), [social development](https://en.wikipedia.org/wiki/Social_change) and environmental protection for future generations. It has been suggested that "the term 'sustainability' should be viewed as humanity's target goal of human-ecosystem equilibrium (homeostasis), while 'sustainable development' refers to the holistic approach and temporal processes that lead us to the end point of sustainability".[[1]](https://en.wikipedia.org/wiki/Sustainable_development#cite_note-1) The modern economies are endeavouring to reconcile ambitious economic development and obligations of preserving the [natural resources](https://en.wikipedia.org/wiki/Natural_resource) and [ecosystem](https://en.wikipedia.org/wiki/Ecosystem_services), the two are traditionally seen as of conflicting nature. Instead of holding climate change commitments and other sustainability measures as a drag to economic development, turning and leveraging them into market opportunities will do greater good. The economic development brought by such organized principles and practices in an [economy](https://en.wikipedia.org/wiki/Economy) is called [Managed Sustainable Development (MSD)](https://en.wikipedia.org/wiki/Managed_Sustainable_Development).

The concept of sustainable development has been—and still is—subject to criticism. What, exactly, is to be sustained in sustainable development? It has been argued that there is no such thing as a sustainable use of a [non-renewable resource](https://en.wikipedia.org/wiki/Non-renewable_resource), since any positive rate of exploitation will eventually lead to the exhaustion of earth's finite stock. This perspective renders the [industrial revolution](https://en.wikipedia.org/wiki/Industrial_revolution) as a whole unsustainable. It has also been argued that the meaning of the concept has opportunistically been stretched from "conservation management" to "economic development", and that the Brundtland Report promoted nothing but a business as usual strategy for world development, with an ambiguous and insubstantial concept attached as a public relations slogan.

## 2.2 History

Sustainability can be defined as the practice of maintaining processes of productivity indefinitely—natural or human made—by replacing resources used with resources of equal or greater value without degrading or endangering natural biotic systems. Sustainable development ties together concern for the [carrying capacity](https://en.wikipedia.org/wiki/Carrying_capacity) of [natural systems](https://en.wikipedia.org/wiki/Systems_ecology) with the social, political, and economic challenges faced by humanity. [Sustainability science](https://en.wikipedia.org/wiki/Sustainability_science) is the study of the concepts of sustainable development and environmental science. There is an additional focus on the present generations' responsibility to regenerate, maintain and improve planetary resources for use by future generations.

Sustainable development has its roots in ideas about [sustainable forest management](https://en.wikipedia.org/wiki/Sustainable_forest_management) which were developed in Europe during the seventeenth and eighteenth centuries. In response to a growing awareness of the depletion of timber resources in England, [John Evelyn](https://en.wikipedia.org/wiki/John_Evelyn) argued that "sowing and planting of trees had to be regarded as a national duty of every landowner, in order to stop the destructive over-exploitation of natural resources" in his 1662 essay [Sylva](https://en.wikipedia.org/wiki/Sylva,_or_A_Discourse_of_Forest-Trees_and_the_Propagation_of_Timber). In 1713 [Hans Carl von Carlowitz](https://en.wikipedia.org/wiki/Hans_Carl_von_Carlowitz), a senior mining administrator in the service of Elector [Frederick Augustus I of Saxony](https://en.wikipedia.org/wiki/Augustus_II_the_Strong) published Sylvicultura oeconomica, a 400-page work on forestry. Building upon the ideas of Evelyn and French minister [Jean-Baptiste Colbert](https://en.wikipedia.org/wiki/Jean-Baptiste_Colbert), von Carlowitz developed the concept of managing forests for [sustained yield](https://en.wikipedia.org/wiki/Sustained_yield). His work influenced others, including [Alexander von Humboldt](https://en.wikipedia.org/wiki/Alexander_von_Humboldt) and [Georg Ludwig Hartig](https://en.wikipedia.org/wiki/Georg_Ludwig_Hartig), eventually leading to the development of a science of forestry. This in turn influenced people like [Gifford Pinchot](https://en.wikipedia.org/wiki/Gifford_Pinchot), first head of the [US Forest Service](https://en.wikipedia.org/wiki/US_Forest_Service), whose approach to forest management was driven by the idea of wise use of resources, and [Aldo Leopold](https://en.wikipedia.org/wiki/Aldo_Leopold) whose [land ethic](https://en.wikipedia.org/wiki/Land_ethic) was influential in the development of the [environmental movement](https://en.wikipedia.org/wiki/Environmental_movement) in the 1960s.

Following the publication of [Rachel Carson](https://en.wikipedia.org/wiki/Rachel_Carson)'s [Silent Spring](https://en.wikipedia.org/wiki/Silent_Spring) in 1962, the developing environmental movement drew attention to the relationship between economic growth and development and environmental degradation. [Kenneth E. Boulding](https://en.wikipedia.org/wiki/Kenneth_E._Boulding) in his influential 1966 essay The Economics of the Coming Spaceship Earth identified the need for the economic system to fit itself to the ecological system with its limited pools of resources. One of the first uses of the term sustainable in the contemporary sense was by the [Club of Rome](https://en.wikipedia.org/wiki/Club_of_Rome) in 1972 in its classic report on the [Limits to Growth](https://en.wikipedia.org/wiki/Limits_to_Growth), written by a group of scientists led by [Dennis](https://en.wikipedia.org/wiki/Dennis_Meadows) and [Donella Meadows](https://en.wikipedia.org/wiki/Donella_Meadows" \o "Donella Meadows) of the [Massachusetts Institute of Technology](https://en.wikipedia.org/wiki/Massachusetts_Institute_of_Technology). Describing the desirable "state of global equilibrium", the authors wrote: "We are searching for a model output that represents a world system that is sustainable without sudden and uncontrolled collapse and capable of satisfying the basic material requirements of all of its people."

In 1980 the [International Union for the Conservation of Nature](https://en.wikipedia.org/wiki/International_Union_for_the_Conservation_of_Nature) published a world conservation strategy that included one of the first references to sustainable development as a global priority and introduced the term "sustainable development".Two years later, the [United Nations](https://en.wikipedia.org/wiki/United_Nations) [World Charter for Nature](https://en.wikipedia.org/wiki/World_Charter_for_Nature) raised five principles of [conservation](https://en.wikipedia.org/wiki/Conservation_(ethic)) by which human conduct affecting nature is to be guided and judged. In 1987 the [United Nations](https://en.wikipedia.org/wiki/United_Nations) [World Commission on Environment and Development](https://en.wikipedia.org/wiki/World_Commission_on_Environment_and_Development) released the report Our Common Future, commonly called the Brundtland Report. The report included what is now one of the most widely recognised definitions of sustainable development.

Since the Brundtland Report, the concept of sustainable development has developed beyond the initial intergenerational framework to focus more on the goal of "socially inclusive and environmentally sustainable economic growth". In 1992, the [UN Conference on Environment and Development](https://en.wikipedia.org/wiki/UN_Conference_on_Environment_and_Development) published the [Earth Charter](https://en.wikipedia.org/wiki/Earth_Charter), which outlines the building of a just, sustainable, and peaceful global society in the 21st century. The action plan [Agenda 21](https://en.wikipedia.org/wiki/Agenda_21) for sustainable development identified information, integration, and participation as key building blocks to help countries achieve development that recognises these interdependent pillars. It emphasises that in sustainable development everyone is a user and provider of information. It stresses the need to change from old sector-centered ways of doing business to new approaches that involve cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes. Furthermore, Agenda 21 emphasises that broad public participation in decision making is a fundamental prerequisite for achieving sustainable development.

Under the principles of the [United Nations Charter](https://en.wikipedia.org/wiki/United_Nations_Charter) the [Millennium Declaration](https://en.wikipedia.org/wiki/United_Nations_Millennium_Declaration) identified principles and treaties on sustainable development, including [economic development](https://en.wikipedia.org/wiki/Economic_development), [social development](https://en.wikipedia.org/wiki/Social_change) and [environmental protection](https://en.wikipedia.org/wiki/Environmental_protection). Broadly defined, sustainable development is a systems approach to growth and development and to manage natural, produced, and [social capital](https://en.wikipedia.org/wiki/Social_capital) for the welfare of their own and future generations. The term sustainable development as used by the United Nations incorporates both issues associated with [land development](https://en.wikipedia.org/wiki/Land_development) and broader issues of [human development](https://en.wikipedia.org/wiki/Human_development_(humanity)) such as education, public health, and standard of living.

A 2013 study concluded that sustainability reporting should be reframed through the lens of four interconnected domains: ecology, economics, politics and culture.

## The [Sustainable Development Goals](https://en.wikipedia.org/wiki/Sustainable_Development_Goals) (SDGs)

In September 2015, the United Nations General Assembly formally adopted the "universal, integrated and transformative" [2030 Agenda for Sustainable Development](https://sustainabledevelopment.un.org/sdgs), a set of 17 [Sustainable Development Goals](https://en.wikipedia.org/wiki/Sustainable_Development_Goals) (SDGs). The goals are to be implemented and achieved in every country from the year 2016 to 2030.

# Permanent crop

## 3.1 Permanent crop

A permanent crop is one produced from [plants](https://en.wikipedia.org/wiki/Plant) which last for many [seasons](https://en.wikipedia.org/wiki/Season), rather than being replanted after each [harvest](https://en.wikipedia.org/wiki/Harvest).

Traditionally, "[arable land](https://en.wikipedia.org/wiki/Arable_land)" included any land suitable for the growing of crops, even if it was actually being used for the production of permanent crops such as [grapes](https://en.wikipedia.org/wiki/Vineyard) or [peaches](https://en.wikipedia.org/wiki/Orchard). Modern [agriculture](https://en.wikipedia.org/wiki/Agriculture)—particularly organizations such as the [CIA](https://en.wikipedia.org/wiki/Central_Intelligence_Agency) and [FAO](https://en.wikipedia.org/wiki/Food_and_Agriculture_Organization)—prefer the [term of art](https://en.wikipedia.org/wiki/Term_of_art) permanent cropland to describe such "[cultivable land](https://en.wikipedia.org/wiki/Cultivable_land)" that is not being used for annually-harvested crops such as [staple grains](https://en.wikipedia.org/wiki/Staple_grain). In such usage, permanent cropland is a form of "[agricultural land](https://en.wikipedia.org/wiki/Agricultural_land)" that includes [grasslands](https://en.wikipedia.org/wiki/Grassland) and [shrublands](https://en.wikipedia.org/wiki/Shrubland" \o "Shrubland) used to grow grape vines or [coffee](https://en.wikipedia.org/wiki/Coffee_plantation); [orchards](https://en.wikipedia.org/wiki/Orchard) used to grow [fruit](https://en.wikipedia.org/wiki/Fruit_orchard) or [olives](https://en.wikipedia.org/wiki/Olive); and forested [plantations](https://en.wikipedia.org/wiki/Plantation) used to grow [nuts](https://en.wikipedia.org/wiki/Nut_plantation) or [rubber](https://en.wikipedia.org/wiki/Rubber_plantation). It does not include, however, [tree farms](https://en.wikipedia.org/wiki/Tree_farm) intended to be used for [wood](https://en.wikipedia.org/wiki/Wood) or [timber](https://en.wikipedia.org/wiki/Timber).

Complex Table (less accessible)

Class Schedule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LESSON** | **TOPIC** | **ASSIGNMENT** | **Points** | **DUE** |
| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
|  | Presentation | 20 |  |
| 2 | History & Theories | Brief Paper | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog #1 | 10 | April 21 |

**DUE**

**1 What is Distance Learning? Wiki #1 10 March 10**

**Presentation 20**

**2 History & Theories Brief Paper 20 March 24**

**Spring Break**

**3 Distance Learners Discussion #1 10 April 7**

**Group Project 50 April 14**

**4 Media Selection Blog #1 10 April 21LESSON**

# Organic farming

Organic farming is an alternative agricultural system which originated early in the 20th century in reaction to rapidly changing farming practices. Organic farming continues to be developed by various organic agriculture organizations today. It relies on fertilizers of organic origin such as compost [manure](https://en.wikipedia.org/wiki/Manure), [green manure](https://en.wikipedia.org/wiki/Green_manure), and [bone meal](https://en.wikipedia.org/wiki/Bone_meal) and places emphasis on techniques such as [crop rotation](https://en.wikipedia.org/wiki/Crop_rotation) and [companion planting](https://en.wikipedia.org/wiki/Companion_planting). [Biological pest control](https://en.wikipedia.org/wiki/Biological_pest_control), mixed cropping and the fostering of insect predators are encouraged.



In general, organic standards are designed to allow the use of naturally occurring substances while prohibiting or strictly limiting synthetic substances. For instance, naturally occurring pesticides such as [pyrethrin](https://en.wikipedia.org/wiki/Pyrethrin" \o "Pyrethrin) and [rotenone](https://en.wikipedia.org/wiki/Rotenone) are permitted, while synthetic [fertilizers](https://en.wikipedia.org/wiki/Fertilizers) and [pesticides](https://en.wikipedia.org/wiki/Pesticide) are generally prohibited. Synthetic substances that are allowed include, for example, [copper sulfate](https://en.wikipedia.org/wiki/Copper(II)_sulfate), elemental [sulfur](https://en.wikipedia.org/wiki/Sulfur) and [Ivermectin](https://en.wikipedia.org/wiki/Ivermectin" \o "Ivermectin). [Genetically modified organisms](https://en.wikipedia.org/wiki/Genetically_modified_organism), [nanomaterials](https://en.wikipedia.org/wiki/Nanomaterials" \o "Nanomaterials), human sewage [sludge](https://en.wikipedia.org/wiki/Sludge), [plant growth regulators](https://en.wikipedia.org/wiki/Plant_growth_regulator), [hormones](https://en.wikipedia.org/wiki/Hormone), and [antibiotic use in livestock](https://en.wikipedia.org/wiki/Antibiotic_use_in_livestock) husbandry are prohibited. Reasons for advocation of organic farming include advantages in [sustainability](https://en.wikipedia.org/wiki/Sustainability), [openness](https://en.wikipedia.org/wiki/Openness), [self-sufficiency](https://en.wikipedia.org/wiki/Self-sufficiency), [autonomy](https://en.wikipedia.org/wiki/Autonomy)/[independence](https://en.wikipedia.org/wiki/Independence), [health](https://en.wikipedia.org/wiki/Health), [food security](https://en.wikipedia.org/wiki/Food_security), and [food safety](https://en.wikipedia.org/wiki/Food_safety).

Organic agricultural methods are internationally regulated and legally enforced by many nations, based in large part on the standards set by the [International Federation of Organic Agriculture Movements](https://en.wikipedia.org/wiki/International_Federation_of_Organic_Agriculture_Movements) (IFOAM), an international [umbrella organization](https://en.wikipedia.org/wiki/Umbrella_organization) for organic farming organizations established in 1972. Organic agriculture can be defined as: an integrated farming system that strives for sustainability, the enhancement of soil fertility and biological diversity whilst, with rare exceptions, prohibiting synthetic pesticides, antibiotics, synthetic fertilizers, genetically modified organisms, and growth hormones.

Since 1990 the market for [organic food](https://en.wikipedia.org/wiki/Organic_food) and other products has grown rapidly, reaching $63 billion worldwide in 2012. This demand has driven a similar increase in organically managed farmland that grew from 2001 to 2011 at a compounding rate of 8.9% per annum. As of 2011, approximately 37,000,000 hectares (91,000,000 acres) worldwide were farmed organically, representing approximately 0.9 percent of total world farmland.

## 4.1 Methods

Organic farming methods combine scientific knowledge of ecology and modern [technology](https://en.wikipedia.org/wiki/Technology) with [traditional farming](https://en.wikipedia.org/wiki/Traditional_agriculture) practices based on naturally occurring biological processes. Organic farming methods are studied in the field of [agroecology](https://en.wikipedia.org/wiki/Agroecology" \o "Agroecology). While conventional agriculture uses synthetic pesticides and water-soluble synthetically purified fertilizers, organic farmers are restricted by regulations to using natural pesticides and fertilizers. An example of a natural pesticide is [pyrethrin](https://en.wikipedia.org/wiki/Pyrethrin" \o "Pyrethrin), which is found naturally in the [Chrysanthemum](https://en.wikipedia.org/wiki/Chrysanthemum) flower. The principal methods of organic farming include [crop rotation](https://en.wikipedia.org/wiki/Crop_rotation), [green manures](https://en.wikipedia.org/wiki/Green_manure) and [compost](https://en.wikipedia.org/wiki/Compost), [biological pest control](https://en.wikipedia.org/wiki/Biological_pest_control), and mechanical [cultivation](https://en.wikipedia.org/wiki/Tillage). These measures use the natural environment to enhance agricultural productivity: [legumes](https://en.wikipedia.org/wiki/Legumes) are planted to fix [nitrogen](https://en.wikipedia.org/wiki/Nitrogen) into the soil, [natural insect predators](https://en.wikipedia.org/wiki/Predation) are encouraged, crops are rotated to confuse pests and renew soil, and natural materials such as [potassium bicarbonate](https://en.wikipedia.org/wiki/Potassium_bicarbonate)and [mulches](https://en.wikipedia.org/wiki/Mulch) are used to control disease and [weeds](https://en.wikipedia.org/wiki/Weed). [Genetically modified](https://en.wikipedia.org/wiki/Genetically_modified_organism) seeds and animals are excluded.

While organic is fundamentally different from conventional because of the use of carbon based fertilizers compared with highly soluble synthetic based fertilizers and [biological pest control](https://en.wikipedia.org/wiki/Biological_pest_control) instead of synthetic pesticides, organic farming and large-scale conventional farming are not entirely mutually exclusive. Many of the methods developed for organic agriculture have been borrowed by more conventional agriculture. For example, [Integrated Pest Management](https://en.wikipedia.org/wiki/Integrated_Pest_Management) is a multifaceted strategy that uses various organic methods of pest control whenever possible, but in conventional farming could include synthetic [pesticides](https://en.wikipedia.org/wiki/Pesticides) only as a last resort.

### 4.1.1 Crop diversity

Organic farming encourages [Crop diversity](https://en.wikipedia.org/wiki/Crop_diversity). The science of [agroecology](https://en.wikipedia.org/wiki/Agroecology" \o "Agroecology) has revealed the benefits of [polyculture](https://en.wikipedia.org/wiki/Polyculture" \o "Polyculture) (multiple crops in the same space), which is often employed in organic farming.[[37]](https://en.wikipedia.org/wiki/Organic_farming#cite_note-37) Planting a variety of vegetable crops supports a wider range of beneficial insects, soil microorganisms, and other factors that add up to overall farm health. Crop diversity helps environments thrive and protects species from going extinct.

### 4.1.2 Soil management

Organic farming relies heavily on the natural breakdown of organic matter, using techniques like [green manure](https://en.wikipedia.org/wiki/Green_manure) and [composting](https://en.wikipedia.org/wiki/Composting), to replace nutrients taken from the soil by previous crops. This biological process, driven by [microorganisms](https://en.wikipedia.org/wiki/Microorganism) such as [mycorrhiza](https://en.wikipedia.org/wiki/Mycorrhiza" \o "Mycorrhiza), allows the natural production of nutrients in the soil throughout the growing season, and has been referred to as feeding the soil to feed the plant. Organic farming uses a variety of methods to improve soil fertility, including crop rotation, cover cropping, reduced tillage, and application of compost. By reducing tillage, soil is not inverted and exposed to air; less carbon is lost to the atmosphere resulting in more soil organic carbon. This has an added benefit of carbon sequestration, which can reduce green house gases and help reverse climate change.

### 4.1.3 Livestock

Raising livestock and poultry, for meat, dairy and eggs, is another traditional farming activity that complements growing. Organic farms attempt to provide animals with natural living conditions and feed. Organic certification verifies that livestock are raised according to the USDA organic regulations throughout their lives. These regulations include the requirement that all animal feed must be certified organic.

Organic livestock may be, and must be, treated with medicine when they are sick, but drugs cannot be used to promote growth, their feed must be organic, and they must be pastured.

Also, horses and cattle were once a basic farm feature that provided labor, for hauling and plowing, fertility, through recycling of manure, and fuel, in the form of food for farmers and other animals. While today, small growing operations often do not include livestock, domesticated animals are a desirable part of the organic farming equation, especially for true sustainability, the ability of a farm to function as a self-renewing unit.

### 4.1.4 Tools

Organic farmers use a number of traditional [farm tools](https://en.wikipedia.org/wiki/Farm_tools) to do farming. Due to the goals of [sustainability](https://en.wikipedia.org/wiki/Sustainability) in organic farming, organic farmers try to minimize their reliance on [fossil fuels](https://en.wikipedia.org/wiki/Fossil_fuels). In the developing world on small organic farms tools are normally constrained to hand tools and [diesel](https://en.wikipedia.org/wiki/Diesel_fuel) powered water pumps.

# Natural Environment

## 5.1 Natural Environment

The natural environment encompasses all [living](https://en.wikipedia.org/wiki/Life) and non-living things occurring [naturally](https://en.wikipedia.org/wiki/Nature), meaning in this case not [artificial](https://en.wikipedia.org/wiki/Artificiality). The term is most often applied to the [Earth](https://en.wikipedia.org/wiki/Earth) or some parts of Earth. This environment encompasses the interaction of all living [species](https://en.wikipedia.org/wiki/Species), [climate](https://en.wikipedia.org/wiki/Climate), weather, and natural resources that affect human survival and economic activity.  The concept of the natural environment can be distinguished as components:

* Complete [ecological](https://en.wikipedia.org/wiki/Ecological) units that function as natural systems without massive civilized human intervention, including all vegetation, [microorganisms](https://en.wikipedia.org/wiki/Microorganism), [soil](https://en.wikipedia.org/wiki/Soil), [rocks](https://en.wikipedia.org/wiki/Rock_(geology)), [atmosphere](https://en.wikipedia.org/wiki/Atmosphere_of_Earth), and [natural phenomena](https://en.wikipedia.org/wiki/Natural_phenomenon) that occur within their boundaries and their nature.
* Universal [natural resources](https://en.wikipedia.org/wiki/Natural_resource) and [physical phenomena](https://en.wikipedia.org/wiki/Physical_phenomena) that lack clear-cut boundaries, such as air, water, and climate, as well as [energy](https://en.wikipedia.org/wiki/Energy), [radiation](https://en.wikipedia.org/wiki/Radiation), [electric charge](https://en.wikipedia.org/wiki/Electric_charge), and [magnetism](https://en.wikipedia.org/wiki/Magnetism), not originating from civilized human actions.

In contrast to the natural environment is the [built environment](https://en.wikipedia.org/wiki/Built_environment). In such areas where man has fundamentally transformed landscapes such as urban settings and agricultural [land conversion](https://en.wikipedia.org/wiki/Land_development), the natural environment is greatly modified into a simplified human environment. Even acts which seem less extreme, such as building a mud [hut](https://en.wikipedia.org/wiki/Hut) or a [photovoltaic system](https://en.wikipedia.org/wiki/Photovoltaic_system) in the [desert](https://en.wikipedia.org/wiki/Desert), modify the natural environment into an artificial one. Though many animals build things to provide a better environment for themselves, they are not human, hence [beaver dams](https://en.wikipedia.org/wiki/Beaver_dam) and the works of [Mound-building termites](https://en.wikipedia.org/wiki/Mound-building_termites) are thought of as natural.

People seldom find absolutely natural environments on Earth, and naturalness usually varies in a continuum, from 100% natural in one extreme to 0% natural in the other. More precisely, we can consider the different aspects or components of an environment, and see that their degree of naturalness is not uniform.[[2]](https://en.wikipedia.org/wiki/Natural_environment#cite_note-2) If, for instance, in an agricultural field, the [mineralogic composition](https://en.wikipedia.org/wiki/Mineralogy" \o "Mineralogy) and the [structure](https://en.wikipedia.org/wiki/Soil_structure) of its soil are similar to those of an undisturbed forest soil, but the structure is quite different.

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